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(54) A VEHICLE AND OCCUPANT PROTECTION DEVICE THEREFOR

(71) We, DR.-ING. h.c.F. PORSCHE AKTIENGESELLSCHAFT, of Porschestrasse 42, Stuttgart-Zuffenhausen, Germany, a German Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a vehicle and occupant protection device therefor and is directed more particularly, although not exclusively, to sports cars.

Passenger vehicles are known in which padding systems which protect the passengers under high deceleration i.e. braking, accidents or the like, are installed on frame elements within the passenger compartment. So that these padding systems may absorb considerable energy and effectively protect the occupants against injury, these components are of necessity of very bulky construction, which results in a decrease of the unobstructed volume of the passenger compartment.

Inflatable bags are already known for use as protection devices which hold a person seated in the vehicle throughout his or her height in the event of high decelerations. Such bulky bags have the known disadvantage however that their action is extremely dangerous for the human body, particularly the auditory organs.

Accordingly, the object of the present invention is to overcome the above disadvantages by providing an improved apparatus which overcomes the difficulties encountered with vehicles having a small passenger space and a low profile.

The present invention consists in a vehicle having an occupant protection device comprising, an inflatable envelope mounted on a roof frame extending along a side of the vehicle which, in use, is positioned adjacent the side of the head of an occupant, the envelope being inflated by a gaseous fluid upon an impact force acting on the vehicle. Preferably, the envelope, in the inflated operative position, only protects the head of the occupant. The envelope preferably includes a moulded surface which is positioned adjacent the occupant's head in the inflated operative position and said moulded surface partially enflanks the head.

The envelope is preferably mounted on a longitudinally extending roof frame and forms a unit with a container in which the gaseous fluid is stored or generated. Preferably, the envelope and the container are of similar length and form part of the roof frame cladding or panelling.

The advantages primarily obtained by means of the present invention are that due to the envelope being positioned adjacent the head, there is no substantial displacement of the head with respect to the roof in the event of a collision. This prevents the head being knocked against the roof frame, thereby preventing serious injuries. If the envelope is mounted on a longitudinally extending roof frame positioned adjacent the occupant's head, for example, in the case of sports and small cars, it provides an effective protection to this occupant against side impacts on the vehicle. The envelope moreover, is less of an obstruction for the auditory organs, since it is of small volume only. Furthermore, the envelope does not materially affect the unobstructed internal space of a passenger compartment.

In the accompanying drawings:—

Fig. 1 is a partial side elevation of a passenger vehicle,

Fig. 2 is a section taken on the line II—II of Fig. 1,

Fig. 3 is a view similar to Fig. 2, but on a greater scale, and

Fig. 4 is a section taken on the line IV—IV of Fig. 3.

The passenger vehicle 1 comprises a superstructure 2 with a roof 3 and a windscreen 4. The roof 3 is reinforced by a roof frame 5 extending transversely to the longitudinal direction A—A of the vehicle and partially securing the windscreen 4, and by a longitudinally extending roof

frame 6. The roof frames 5, 6 are joined to pillars 7, 8 extending in a generally upright direction.

The compartment 10 of the vehicle 1 is accessible through a door 9 and a person B whose upper body portion 11 and head 12 are illustrated, is shown seated within the compartment 10.

An inflatable envelope 13 is positioned adjacent the area C of the head on the roof frame 6 for the protection of the person B. The envelope 13 protects the area C of the head exclusively and is inflatable from an inoperative position D to an operative position F. The envelope 13 comprises a moulded surface 14 which extends adjacent the head 12 and partially enflanks the latter. The moulded surface is formed in such manner that its effectiveness is also ensured in the event of a change in the seated position of the person B.

The envelope 13 forms a unit with a container 15 which stores a gaseous fluid with which the envelope 13 is inflated. The gaseous fluid may be heat-generated. Openings 16 through which the fluid enters the envelope 13 are positioned in a side wall of the container 15 adjacent the envelope and valves 17 which are opened by means of a diagrammatically illustrated actuating system 18 having an indicating system 19, are associated with the openings 16. The actuating system 18 and the indicating system 19 may be mechanically as well as electronically constructed.

The envelopes 13 and the container 15 which are of similar lengths, form part of the roof frame cladding or panelling 20 so that these components may be stowed without affecting the unobstructed space of the compartment 10.

In the event of a lateral impact P on the vehicle, a sidewall 21 of the vehicle 1 is deformed and the indicating system 19 is activated which causes the valves 17 within the container 15 to be opened by means of the actuating system 18 so that the fluid in the container enters the envelope 13 which inflates and, in its operating position F, assumes the position illustrated by dash-dotted lines. A relative displacement of the head 12 of the person B with respect to the roof frame 6 and consequent injury are then prevented by the inflated envelope 13.

The envelope 13 described above is particularly useful in combination with a belt system, since two safety systems are thereby provided in combination for vehicles having a small internal volume and a low profile, in which the roof frames commonly extend adjacent the heads of the occupants.

WHAT WE CLAIM IS:—

1. A vehicle having an occupant protection device comprising, an inflatable envelope mounted on a roof frame extending along a side of the vehicle which, in use, is positioned adjacent the side of the head of an occupant, the envelope being inflated by a gaseous fluid upon an impact force acting on the vehicle.

2. A vehicle according to claim 1, wherein the envelope in the inflated operative position only protects the head of the occupant.

3. A vehicle according to claim 2, wherein the envelope includes a moulded surface which is positioned adjacent the occupant's head when the envelope is in the inflated operative position.

4. A vehicle according to claim 3, wherein the moulded surface partially enflanks the occupant's head.

5. A vehicle according to any of claims 1 to 4, wherein the envelope is mounted on a longitudinally extending roof frame.

6. A vehicle according to any of claims 1 to 5, wherein the envelope forms a unit with a container in which the gaseous fluid is stored or generated.

7. A vehicle according to claim 6, wherein the envelope and the container are of similar length.

8. A vehicle according to claim 6 or 7, wherein the envelope and the container form part of the roof cladding or panelling.

9. A vehicle having an occupant protection device substantially as described with reference to the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig.1

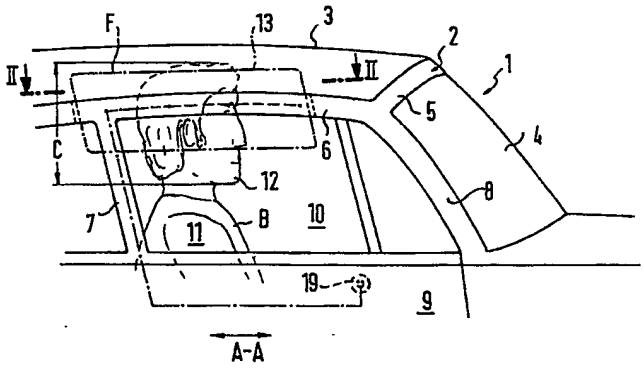

Fig.2

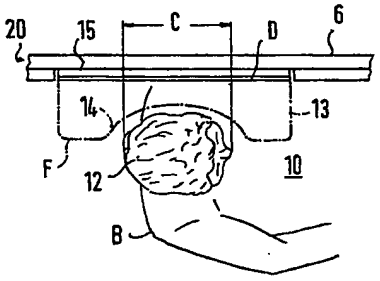

Fig.3

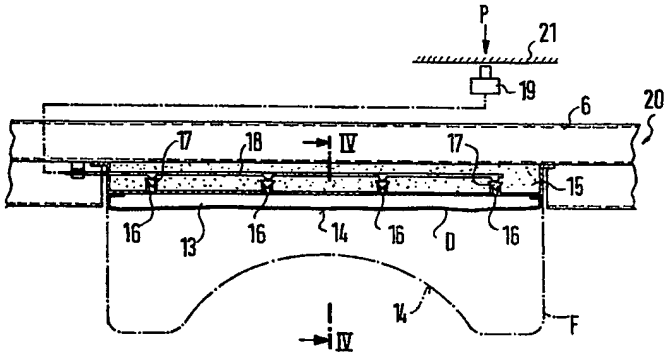
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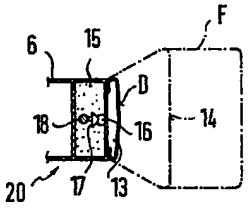
Fig.4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